CLAIMS

What is claimed is:

1. A method of signal transmission, comprising overlapping a plurality of direct-sequence spread-spectrum signals using carrier frequencies that are orthogonally spaced relative to an integral multiple of a bit rate.

2. The method of claim 1, further comprising common frequency-hopping encoding said plurality of direct-sequence spread-spectrum signals

3. The method of claim 1, further comprising individual, differential frequency-hopping encoding each of said plurality of direct-sequence spread-spectrum signals.

4. The method of claim 1, wherein the frequency-hopping modulation is performed in a continuous-phase manner.

5. The method of claim 1, further comprising time-hopping encoding said plurality of direct-sequence spread-spectrum signals.

6. The method of claim 5, further comprising frequency-hopping encoding said plurality of direct-sequence spread-spectrum signals.

7. The method of claim 1, wherein overlapping includes synchronously allocating each of a plurality of users to one of a plurality of orthogonal channels.

8. The method of claim 1, wherein overlapping includes encoding a frequency shift in a subset of bits that compose a code word.

9. The method of claim 1, wherein overlapping includes establishing a bit-clock synchronization; multiplying an incoming signal by an estimate of a desired signal; and integrating a product over an integral multiple of a bit period.

10. The method of claim 1, further comprising retransmitting one of said plurality of direct-sequence spread-spectrum signals.

11. The method of claim 1, further comprising checking one of said plurality of direct-sequence spread-spectrum signals with an error-correcting code.

12. A transmitter for performing the method of claim 1.

13. A waveform made by the method of claim 1.

14. An electronic medium, comprising a program for performing the method of claim 1.

15. A computer program, comprising computer- or machine-readable program elements translatable for implementing the method of claim 1.

16. An apparatus, comprising:

a pseudonoise (PN) code generator; and

a frequency synthesizer coupled to said PN code generator,

wherein a set of p bits provided to said frequency synthesizer selects an operating band, and said PN code generator provides a subset of m bits from a full n-bit PN code to said frequency synthesizer to generate a carrier frequency within said operating band.

17. A method for transmitting a waveform which comprises deploying the apparatus of claim 16.

18. An apparatus for receiving signals transmitted by the apparatus of claim 16.

19. An apparatus, comprising:

a pseudonoise (PN) code generator;

a coincidence gate coupled to said PN code generator;

a data gate coupled to said coincidence gate;

an XOR gate coupled to both said data gate and said PN code generator;

a balanced modulator coupled to said XOR gate;

a frequency synthesizer coupled to said balanced modulator; and

a switch coupled to said balanced modulator,

wherein said PN code generator provides a subset of *m* bits from a full *n*-bit PN code to said coincidence gate to **1)** gate a burst of data from said data gate through said XOR gate to said balanced modulator and **2)** gate on said switch, said PN code generator providing said full *n*-bit PN code to said balanced modulator via said XOR gate.

20. A method for transmitting a waveform which comprises deploying the apparatus of claim 19

21. An apparatus for receiving signals transmitted by the apparatus of claim 19.

22. An apparatus, comprising:

a pseudonoise (PN) code generator;

a frequency synthesizer coupled to said PN code generator;

a coincidence gate coupled to said PN code generator;

a data gate coupled to said coincidence gate;

an XOR gate coupled to both said data gate and said PN code generator;

a balanced modulator coupled to both said XOR gate and said frequency synthesizer; and

a switch coupled to said balanced modulator,

wherein a set of p bits provided to said frequency synthesizer selects an operating band, said PN code generator provides a subset of m bits from a full n-bit PN code to said frequency synthesizer to generate a carrier frequency within said operating band, and said PN code generator provides a subset of l bits from said full n-bit PN code to said coincidence gate to **1)** gate a burst of data from said data gate through said XOR gate to said balanced modulator and **2)** gate on said switch, said PN code generator providing said full n-bit PN code to said balanced modulator via said XOR gate.

23. A method for transmitting a waveform which comprises deploying the apparatus of claim 22.

24. An apparatus for receiving signals transmitted by the apparatus of claim 22.

25. A computer program comprising computer program means adapted to perform the steps of overlapping a plurality of direct-sequence spread-spectrum signals using carrier frequencies that are orthogonally spaced relative to an integral multiple of a bit rate when said program is run on a computer.

26. A computer program as claimed in claim 25, embodied on a computer-readable medium.

27. A method, comprising providing a direct-sequence spread-spectrum communication system that increases a number of users by utilizing a plurality of closely spaced orthogonal carriers that produce overlapping spectra.

28. The method of claim 27, wherein a spacing of the plurality of orthogonal carriers is based on a symbol rate and not a chip rate.

29. The method of claim 28, further comprising frequency-hopping encoding the overlapping spectra.

30. The method of claim 28, further comprising time-hopping encoding the overlapping spectra.

31. The method of claim 30, further comprising frequency-hopping encoding the overlapping spectra.

32. A method of signal transmission, comprising overlapping a plurality of synchronous direct-sequence spread-spectrum signals using carrier frequencies that are orthogonally spaced relative to integral sub-multiples of at least one bit rate.

33. The method of claim 32 wherein the plurality of synchronous direct-sequence spread-spectrum signals are overlapped relative to an integral sub-multiple of a common bit rate.

34. A method of signal transmission, comprising overlapping a plurality of synchronous direct-sequence spread-spectrum signals using carrier frequencies that are orthogonally spaced relative to one-half of a bit rate.